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EXAMINER

GREENE, JASON M

ART UNIT	PAPER NUMBER
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1724

4
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Please find below and/or attached an Office communication concerning this application or proceeding.

mk-4

Office Action Summary

Application No.

09/725,845

Applicant(s)

ZHANG ET AL.

Examiner

Jason M. Greene

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) 1,8,12,13,16 and 21 is/are objected to.
- 8) ☒ Claim(s) 1-12 and 13-21 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4</u> . | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-12, drawn to a process for selectively adsorbing a component of a gas mixture, classified in class 95, subclass 90.
 - II. Claims 13-21, drawn to a composition for selectively adsorbing a component of a gas mixture, classified in class 252, subclass 182.14.

2. The inventions are distinct, each from the other because:

Inventions Group I and Group II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed can be used to practice another materially different process, such as catalytically purifying the exhaust from an internal combustion engine.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Drawings

4. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Specification

5. The Examiner suggests Applicant update the status of the application on page 6, lines 23-24. U.S. Serial No. 08/784,175, filed 15 January 1997, is now abandoned.
6. The disclosure is objected to because of the following informalities: The chemical structure of the tetracarbonyl radical at the top of page 22 of the Specification indicates that the uppermost carbon atom forms 5 bonds with adjacent atoms and that the leftmost C=O group is not bonded to the central R¹ group. Since it is well known in the art that carbon atoms form 4 bonds with adjacent atoms, it appears as though the double bond between the central R¹ group and the uppermost carbon atom should be replaced by a single bond between the central R¹ group and the uppermost carbon atom and a single bond between the central R¹ group and the leftmost carbon atom.

Appropriate correction is required.

Claim Objections

7. Claims 1 and 13 are objected to because of the following informalities: The reference to Figure 1 in line 6 of the claims is improper. Appropriate correction is required.

8. Claim 12 is objected to because of the following informalities: The reference to Figure 3 in line 6 of the claim is improper. Appropriate correction is required.

9. Claim 21 is objected to because of the following informalities: Claim 21 is dependent upon claim 12. However, it appears as though claim 21 should be dependent upon claim 13. Appropriate correction is required.

10. Claims 8 and 16 are objected to because of the following informalities: The lowermost chemical structure in the claim indicates that the uppermost carbon atom forms 5 bonds with adjacent atoms and that the leftmost C=O group is not bonded to the central R¹ group. Since it is well known in the art that carbon atoms form 4 bonds with adjacent atoms, it appears as though the double bond between the central R¹ group and the uppermost carbon atom should be replaced by a single bond between the central R¹ group and the uppermost carbon atom and a single bond between the central R¹ group and the leftmost carbon atom.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1, 12, and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 12, and 13, the phrase "and/or" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the

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claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 12 recites the broad recitation of x being from 0 to 6, and the claim also recites x being 0 or 1 which is the narrower statement of the range/limitation.

Claim Rejections - 35 USC § 103

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 1-4 are rejected under 35 U.S.C. 102(b) as anticipated by Dalton, Jr. et al. or, in the alternative, under 35 U.S.C. 103(a) as obvious over Dalton, Jr. et al. in view of Yaghi.

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With regard to claim 1, Dalton, Jr. et al. discloses a process for selectively adsorbing a component of a gas mixture, which comprises contacting the mixture with a solid state, selective adsorbent material comprising a porous framework of a plurality of transition element complexes (TEC) having the claimed formula wherein, M is a primary transition metal ion, D to D₄ are primary donors and m is one, at least three of D to D₄ are occupying primary donor coordination sites on M but leaving at least one open coordination site on M for the component to react with M, G to G₄ are functional groups and n is one, at least one of G to G₄ being intramolecularly bonded to at least three adjacent primary donors to form at least one 5 or 6 member chelate ring on the primary transition metal ion and providing at least three donors thereto, M, D to D₄, and G to G₄ together define one or more transition metal complexes, wherein said complexes are the same and wherein k is 1 in col. 3, lines 1-48 and col. 4, line 62 to col. 5, line 3.

Dalton, Jr. et al. discloses R being an intermolecular connecting group being a polymer material having multifunctional organic groups forming covalent bonds with one or more of groups G to G₄ on the respective TECs, wherein the R group bonds or spaces the respective TECs to and from one another to maintain them in a porous framework, wherein z is from 1 to 8 and R may be the same or different when z is greater than 1, and wherein y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of the desired component thereon in col. 5, lines 37-40.

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Alternatively, Yaghi discloses a similar selective adsorbent material wherein R is an intermolecular connecting group which bonds or spaces the respective TECs to and from one another to maintain them in a porous framework, wherein z is from 1 to 8 and R may be the same or different when z is greater than 1, and wherein y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of the desired component thereon in col. 4, line 39 to col. 5, line 59. Yaghi discloses R being a secondary metal ion (cation in the corresponding salt) coordinated with secondary donors (e.g. chloride or bromide) bonded to one or more of groups G to G₄ on the respective TECs in col. 5, lines 31-37. Yaghi discloses R being an alkyl or aryl amine having multifunctional organic groups forming covalent bonds with one or more of groups G to G₄ on the respective TECs in col. 5, lines 8-15. Yaghi discloses R being an aliphatic or aryl alcohol having functional groups (OH) forming hydrogen bonds with one or more of groups G to G₄ on the respective TECs in col. 5, lines 27-30.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the intermolecular connecting groups of Yaghi into the selective adsorbent material of Dalton, Jr. et al. to form crystalline metal-organic solids having controlled pore distribution and size which are capable of binding and transferring molecules, as suggested by Yaghi in col. 3, lines 37-53.

With regard to claim 2, Dalton, Jr. et al. discloses the transition metal ion M being an element from the first row of transition metals (Co) in col. 4, lines 61-68.

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With regard to claim 3, Dalton, Jr. et al. discloses the donors D to D₄ being neutral Nitrogen and Oxygen in col. 4, lines 61-68.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. or Dalton, Jr. et al. and Yaghi as applied to claim 1 above, and further in view of Roman.

Dalton, Jr. et al. discloses G to G₄ being the same and being amino groups, wherein R¹, R², and R³ are the same or different and are unsubstituted acyclic or carbocyclic groups, or substituted by Fluorine in col. 3, lines 6-7. Dalton, Jr. et al. discloses G to G₄ being imino groups, wherein R¹, R², and R³ are different and are unsubstituted acyclic or carbocyclic groups in col. 4, lines 61-68.

Dalton, Jr. et al. and Yaghi do not explicitly disclose the amino group having the structure $-NR^1R^2R^3$ or the imino group having the structure $-N=CR^1R^2$.

Roman discloses G to G₄ being the same and being alkoxy groups having the formula $-R^1O^-$, wherein R¹, R², and R³ are the same or different and are unsubstituted acyclic or carbocyclic groups in col. 9, lines 1-48. Roman discloses G to G₄ being the same and being nitro groups having the formula $-R^1-NO_2$, wherein R¹, R², and R³ are the same or different and are unsubstituted acyclic or carbocyclic groups in col. 9, lines 1-48.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G₄ ligand groups of Roman for the G to G₄ ligand groups of Dalton, Jr. et al. to provide better gas adsorption or desorption

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properties. Mere substitution of one known G to G₄ ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

16. Claims 5, 8, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. in view of Yaghi.

Dalton, Jr. et al. does not disclose R being a member of groups (i), (ii), (iii), or (iv) and having one of the claimed formulas.

With regard to claim 5, Yaghi discloses R being a member of group (i) and having the claimed structure wherein D' is a secondary donor (e.g. chloride or bromide) which is capable of being bonded to at least a G to G₄ group or a chelate ring on a coordination site on M and may also bond to an adjacent R group within the porous framework, and M' is a secondary metal ion (e.g. Co(II) or Fe(II)) coordinated with secondary donors D' wherein x is zero and z is one, said structure bonding the respective TECs to one another to form the porous framework in col. 5, lines 31-37 and col. 4, lines 44-52.

With regard to claim 8, Yaghi discloses R being a member of group (ii) and being a alkyl organic acid having the formula HOOC-R¹-COOH, wherein R¹ is a substituted or unsubstituted acyclic or carbocyclic group and is unsubstituted in col. 5, lines 21-23.

With regard to claim 10, Yaghi discloses R being a member of group (iii) and being an alkyl amino group having the formula R¹R²N-, wherein R¹ and R² are the same or different and are unsubstituted acyclic or carbocyclic group in col. 5, lines 9-12.

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With regard to claim 11, Yaghi discloses R being a member of group (iv) and being an alkylammonium or arylammonium cation having the formula $-(R^1R^2R^3R^4)N^+$, wherein R^1 , R^2 , R^3 , and R^4 are the same or different and are hydrogen and at least one of which is an unsubstituted acyclic or carbocyclic group when the TECs are anionic in col. 5, lines 9-15.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the intermolecular connecting groups of Yaghi into the selective adsorbent material of Dalton, Jr. et al. to form crystalline metal-organic solids having controlled pore distribution and size which are capable of binding and transferring molecules, as suggested by Yaghi in col. 3, lines 37-53.

17. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. and Yaghi as applied to claim 5 above, and further in view of Norman et al. and Roman.

Dalton, Jr. et al. and Yaghi do not disclose the TECs being $Co(Me_2Ac_2H_2malen)(4-Py-O^-)$.

Norman et al. discloses the TECs being $Co(Me_2Ac_2H_2malen)$ wherein R_3 is a carbonyl functionality having a C_2 hydrocarbon substituent, Y is $(CH_2)_2$, R_1 is a C_1 alkyl group, and R_2 is hydrogen in col. 3, lines 1-31.

Roman discloses providing pyridines such as 4-methoxypyridine ($4-Py-O^-$) to the TECs in col. 5, lines 1-14.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the (4-Py-O⁻) of Roman into the TECs of Norman et al. to provide an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Roman in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G₄ ligand groups of Norman et al. and Roman for the G to G₄ ligand groups of Dalton, Jr. et al. and Yaghi to provide better gas adsorption or desorption properties. Mere substitution of one known G to G₄ ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

18. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. and Yaghi as applied to claim 5 above, and further in view of Norman et al. and Roman.

Dalton, Jr. et al. and Yaghi do not disclose the TECs being Co(Me₂Ac₂H₂maltmen)(4-Py-O⁻).

Norman et al. discloses the TECs being Co(Me₂Ac₂H₂malen) wherein R₃ is a carbonyl functionality having a C₂ hydrocarbon substituent, Y is (CH₂)₂, R₁ is a C₁ alkyl group, and R₂ is hydrogen in col. 3, lines 1-31.

Roman discloses a similar TEC wherein Y is (CH₃)₂-C-C-(CH₃)₂ in col. 9, lines 1-48 and providing pyridines such as 4-methoxypyridine (4-Py-O⁻) to the TECs in col. 5, lines 1-14.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the (4-Py-O⁻) and branched (CH₃)₂-C-C-(CH₃)₂ group of Roman into the TECs of Norman et al. to provide an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Norman et al. in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G₄ ligand groups of Roman for the G to G₄ ligand groups of Dalton, Jr. et al. to provide better gas adsorption or desorption properties. Mere substitution of one known G to G₄ ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

19. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. and Yaghi as applied to claim 8 above, and further in view of Roman.

Dalton, Jr. et al. and Yaghi do not disclose the TECs being Co(Me₂Ac₂H₂malophen)Py.

Roman discloses the TECs being Co(Me₂Ac₂H₂malophen) wherein X is oxygen, the R adjacent the X is methyl, and the R connecting the N atoms is an aryl in col. 5, lines 19-25 and col. 6, lines 25-47. Roman further discloses providing pyridines to the TECs in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Py of Roman into the TECs of Roman to provide

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an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Roman in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G₄ ligand groups of Roman for the G to G₄ ligand groups of Dalton, Jr. et al. and Yaghi to provide better gas adsorption or desorption properties. Mere substitution of one known G to G₄ ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

20. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al., Yaghi, and Roman.

Dalton, Jr. et al. discloses a process for selectively adsorbing a component of a gas mixture, which comprises contacting the mixture with a solid state, selective adsorbent material comprising a porous framework of a plurality of transition element complexes (TEC) having the claimed formula wherein, M is a primary transition metal ion selected to be Co(II), D to D₄ are primary donors occupying primary donor coordination sites on M but leaving at least one open coordination site on M an oxygen molecule to react with M, G to G₄ are functional groups and n is one, at least one of G to G₄ being intramolecularly bonded to at least three adjacent primary donors to form at least one 5 or 6 member chelate ring on the primary transition metal ion and providing at least three donors thereto, M, D to D₄, and G to G₄ together define one or more

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transition metal complexes, wherein said complexes are the same in col. 3, lines 1-48 and col. 4, line 62 to col. 5, line 3.

Yaghi discloses D' being a secondary donor (e.g. chloride or bromide) which is capable of being bonded to a chelate ring on a coordination site on M, and M' is a secondary metal ion (e.g. Co(II) or Fe(II)) coordinated with secondary donors D' wherein x is zero and z is one, the group bonding the respective TECs to one another to form the porous framework, and wherein y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of oxygen thereon in col. 4, line 39 to col. 5, line 59.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the intermolecular connecting groups of Yaghi into the selective adsorbent material of Dalton, Jr. et al. to form crystalline metal-organic solids having controlled pore distribution and size which are capable of binding and transferring molecules, as suggested by Yaghi in col. 3, lines 37-53.

21. Claims 13 is rejected under 35 U.S.C. 102(b) as anticipated by Dalton, Jr. et al. or, in the alternative, under 35 U.S.C. 103(a) as obvious over Dalton, Jr. et al. in view of Yaghi.

Dalton, Jr. et al. discloses a process for selectively adsorbing a component of a gas mixture, which comprises contacting the mixture with a solid state, selective adsorbent material comprising a porous framework of a plurality of transition element complexes (TEC) having the claimed formula wherein, M is a primary transition metal

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ion, D to D₄ are primary donors and m is one, at least three of D to D₄ are occupying primary donor coordination sites on M but leaving at least one open coordination site on M for the component to react with M, G to G₄ are functional groups and n is one, at least one of G to G₄ being intramolecularly bonded to at least three adjacent primary donors to form at least one 5 or 6 member chelate ring on the primary transition metal ion and providing at least three donors thereto, M, D to D₄, and G to G₄ together define one or more transition metal complexes, wherein said complexes are the same and wherein k is 1 in col. 3, lines 1-48 and col. 4, line 62 to col. 5, line 3. Dalton, Jr. et al. discloses R being an intermolecular connecting group being a polymer material having multifunctional organic groups forming covalent bonds with one or more of groups G to G₄ on the respective TECs, wherein the R group bonds or spaces the respective TECs to and from one another to maintain them in a porous framework, wherein z is from 1 to 8 and R may be the same or different when z is greater than 1, and wherein y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of the desired component thereon in col. 5, lines 37-40.

Alternatively, Yaghi discloses a similar selective adsorbent material wherein R is an intermolecular connecting group which bonds or spaces the respective TECs to and from one another to maintain them in a porous framework, wherein z is from 1 to 8 and R may be the same or different when z is greater than 1, and wherein y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of the desired component thereon in col. 4, line 39 to col. 5, line 59. Yaghi discloses R being a secondary metal ion (cation in the corresponding salt) coordinated

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with secondary donors (e.g. chloride or bromide) bonded to one or more of groups G to G₄ on the respective TECs in col. 5, lines 31-37. Yaghi discloses R being an alkyl or aryl amine having multifunctional organic groups forming covalent bonds with one or more of groups G to G₄ on the respective TECs in col. 5, lines 8-15. Yaghi discloses R being an aliphatic or aryl alcohol having functional groups (OH) forming hydrogen bonds with one or more of groups G to G₄ on the respective TECs in col. 5, lines 27-30.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the intermolecular connecting groups of Yaghi into the selective adsorbent material of Dalton, Jr. et al. to form crystalline metal-organic solids having controlled pore distribution and size which are capable of binding and transferring molecules, as suggested by Yaghi in col. 3, lines 37-53.

22. Claims 14, 16, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. in view of Yaghi.

Dalton, Jr. et al. does not disclose R being a member of groups (i), (ii), (iii), or (iv) and having one of the claimed formulas.

With regard to claim 14, Yaghi discloses R being a member of group (i) and having the claimed structure wherein D' is a secondary donor (e.g. chloride or bromide) which is capable of being bonded to at least a G to G₄ group or a chelate ring on a coordination site on M and may also bond to an adjacent R group within the porous framework, and M' is a secondary metal ion (e.g. Co(II) or Fe(II)) coordinated with secondary donors D' wherein x is zero and z is one, said structure bonding the

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respective TECs to one another to form the porous framework in col. 5, lines 31-37 and col. 4, lines 44-52.

With regard to claim 16, Yaghi discloses R being a member of group (ii) and being a alkyl organic acid having the formula $\text{HOOC-R}^1\text{-COOH}$, wherein R^1 is a substituted or unsubstituted acyclic or carbocyclic group and is unsubstituted in col. 5, lines 21-23.

With regard to claim 20, Yaghi discloses R being a member of group (iii) and being an alkyl amino group having the formula $\text{R}^1\text{R}^2\text{N-}$, wherein R^1 and R^2 are the same or different and are unsubstituted acyclic or carbocyclic group in col. 5, lines 9-12.

With regard to claim 21, Yaghi discloses R being a member of group (iv) and being an alkylammonium or arylammonium cation having the formula $-(\text{R}^1\text{R}^2\text{R}^3\text{R}^4)\text{N}^+$, wherein R^1 , R^2 , R^3 , and R^4 are the same or different and are hydrogen and at least one of which is an unsubstituted acyclic or carbocyclic group when the TECs are anionic in col. 5, lines 9-15.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the intermolecular connecting groups of Yaghi into the selective adsorbent material of Dalton, Jr. et al. to form crystalline metal-organic solids having controlled pore distribution and size which are capable of binding and transferring molecules, as suggested by Yaghi in col. 3, lines 37-53.

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23. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. and Yaghi as applied to claim 14 above, and further in view of Norman et al. and Roman.

Dalton, Jr. et al. and Yaghi do not disclose the TECs being $\text{Co}(\text{Me}_2\text{Ac}_2\text{H}_2\text{malen})(4\text{-Py-O}^-)$ or $\text{Co}(\text{Me}_2\text{Ac}_2\text{H}_2\text{maltmen})(4\text{-Py-O}^-)$.

Norman et al. discloses the TECs being $\text{Co}(\text{Me}_2\text{Ac}_2\text{H}_2\text{malen})$ wherein R_3 is a carbonyl functionality having a C_2 hydrocarbon substituent, Y is $(\text{CH}_2)_2$, R_1 is a C_1 alkyl group, and R_2 is hydrogen in col. 3, lines 1-31.

Roman discloses providing pyridines such as 4-methoxypyridine (4-Py-O^-) to the TECs in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the (4-Py-O^-) of Roman into the TECs of Norman et al. to provide an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Roman in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G_4 ligand groups of Norman et al. and Roman for the G to G_4 ligand groups of Dalton, Jr. et al. and Yaghi to provide better gas adsorption or desorption properties. Mere substitution of one known G to G_4 ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

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Furthermore, Roman discloses a similar TEC wherein Y is $(\text{CH}_3)_2\text{-C-C-(CH}_3)_2$ in col. 9, lines 1-48 and providing pyridines such as 4-methoxypyridine (4-Py-O^-) to the TECs in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the (4-Py-O^-) and branched $(\text{CH}_3)_2\text{-C-C-(CH}_3)_2$ group of Roman into the TECs of Norman et al. to provide an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Norman et al. in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G_4 ligand groups of Roman for the G to G_4 ligand groups of Dalton, Jr. et al. to provide better gas adsorption or desorption properties. Mere substitution of one known G to G_4 ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

24. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. and Yaghi as applied to claim 16 above, and further in view of Roman.

Dalton, Jr. et al. and Yaghi do not disclose the TECs being $\text{Co}(\text{Me}_2\text{Ac}_2\text{H}_2\text{malophen})\text{Py}$.

Roman discloses the TECs being $\text{Co}(\text{Me}_2\text{Ac}_2\text{H}_2\text{malophen})$ wherein X is oxygen, the R adjacent the X is methyl, and the R connecting the N atoms is an aryl in col. 5,

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lines 19-25 and col. 6, lines 25-47. Roman further discloses providing pyridines to the TECs in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Py of Roman into the TECs of Roman to provide an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Roman in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G₄ ligand groups of Roman for the G to G₄ ligand groups of Dalton, Jr. et al. and Yaghi to provide better gas adsorption or desorption properties. Mere substitution of one known G to G₄ ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

25. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. and Yaghi as applied to claim 16 above, and further in view of Norman et al. and Roman.

Dalton, Jr. et al. and Yaghi do not disclose the TECs being Co(Me₂H₂H₂maltmen)(4-Py-O⁻).

Norman et al. discloses the TECs being Co(Me₂H₂H₂malen) wherein R₃ is a hydrogen, Y is (CH₂)₂, R₁ is a C₁ alkyl group, and R₂ is hydrogen in col. 3, lines 1-31.

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Roman discloses a similar TEC wherein Y is $(\text{CH}_3)_2\text{-C-C-}(\text{CH}_3)_2$ in col. 9, lines 1-48 and providing pyridines such as 4-methoxypyridine (4-Py-O^-) to the TECs in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the (4-Py-O^-) and branched $(\text{CH}_3)_2\text{-C-C-}(\text{CH}_3)_2$ group of Roman into the TECs of Norman et al. to provide an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Norman et al. in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G_4 ligand groups of Roman for the G to G_4 ligand groups of Dalton, Jr. et al. to provide better gas adsorption or desorption properties. Mere substitution of one known G to G_4 ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

26. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. and Yaghi as applied to claim 16 above, and further in view of Norman et al. and Roman.

Dalton, Jr. et al. and Yaghi do not disclose the TECs being $\text{Co}(\text{Me}_2\text{H}_2\text{H}_2\text{malmen})(4\text{-Py-O}^-)$.

Norman et al. discloses the TECs being $\text{Co}(\text{Me}_2\text{H}_2\text{H}_2\text{malen})$ wherein R_3 is a hydrogen, Y is $(\text{CH}_2)_2$, R_1 is a C_1 alkyl group, and R_2 is hydrogen in col. 3, lines 1-31.

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Roman discloses a similar TEC wherein Y is $(\text{CH}_2)\text{-C-(CH}_3)_2$ in col. 9, lines 1-48 and providing pyridines such as 4-methoxypyridine (4-Py-O^-) to the TECs in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the (4-Py-O^-) and branched $(\text{CH}_3)_2\text{-C-C-(CH}_3)_2$ group of Roman into the TECs of Norman et al. to provide an additional coordinating atom to those on the TECs to assist in the reversible binding of oxygen, as suggested by Norman et al. in col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the G to G_4 ligand groups of Roman for the G to G_4 ligand groups of Dalton, Jr. et al. to provide better gas adsorption or desorption properties. Mere substitution of one known G to G_4 ligand group for another without a showing of unexpected or unobvious results being within the scope of one having ordinary skill in the art.

Double Patenting

27. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in

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scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

28. Claims 1-12 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-7 and 9-11 of copending Application No. 09/458,066. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Conclusion

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Friesen et al., Sugie, Fogler et al., Ramprasad et al. '037, Stephenson et al., and Mullhaupt et al. references disclose similar selective gas adsorbents.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (703) 308-6240. The examiner can normally be reached on Tuesday - Friday (7:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Simmons can be reached on (703) 308-1972. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

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305-7718 for regular communications and (703) 872-9311 for After Final communications.


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jason M. Greene
Examiner
Art Unit 1724



jmg
December 21, 2001

DUANE SMITH
PRIMARY EXAMINER


12-31-01